SECTION 5
CONFIGURATION STATUS ACCOUNTING

QUESTIONS THIS SECTION WILL ANSWER	Para.
1. What is Configuration Status Accounting? What is its purpose?	5.1
2. Does the Government need to do configuration status accounting? What are the basic differences between Government and contractor CSA?	5.2
3. How does the process vary over the life cycle? What are the CSA tasks to be accomplished? What are the outputs from CSA and how are they used?	5.1, 5.2
4. What processes have to be in place in order for a complete status accounting process to be possible?	5.2, 5.3
5. How can a status accounting process be evaluated?	5.3
6. What information should be captured over the life cycle of the program?? What information does the contractor capture? What are the inputs that the Government needs over the life cycle?	5.2, 5.3
7. What is the purpose of the MIL-STD-2549 data model? How do we use it to achieve a consistent array of information between the Government and prime/subcontractors and vendors?	5.2, 5.3
8. How should CSA be tailored to meet the needs of a specific program?	5.3, Appendix B

5.1 Configuration Status Accounting Activity.

Configuration status accounting (CSA) is the process of creating and organizing the knowledge base necessary for the performance of configuration management. In addition to facilitating CM, the purpose of CSA is to provide a highly reliable source of configuration information to support all program/project activities including program management, systems engineering, manufacturing, software development and maintenance, logistic support, modification, and maintenance.

Figure 5-1 is the activity model for CSA. The inputs, outputs, facilitators and constraints in this model are simply extracted from the overall CM activity model in section 2. **(Refer back to Figure 2-1)** CSA receives information from the other CM and related activities as the functions are performed. It is constrained only by contractual provisions which establish the program life cycle phase, tasks to be performed and the organization (Government or contractor) tasked to perform them. In addition to the use of automated configuration management tools based on the MIL-STD-2549 conceptual schema, the process is aided or facilitated by the documented CM process and open communications. The outputs from this activity provide visibility into CM document and activity status and into configuration information concerning the product and its documentation. They also include “metrics” developed from the information collected in the CSA system and management “prompts” resulting from analysis of the CM data base.

5.2 CSA Concepts and Principles.

Because the complexion of the objects about which status accounting information is collected changes during the item life cycle, as shown in **Figure 5-2**, the specific outputs will vary. The inputs and outputs in Figure 5-1 may be thought of as generic categories for which there are different specifics in each phase.

The high level summary of CSA tasks shown in the center of Figure 5-1 reflect the functional performance capabilities of a complete CSA process which includes both Government and contractor

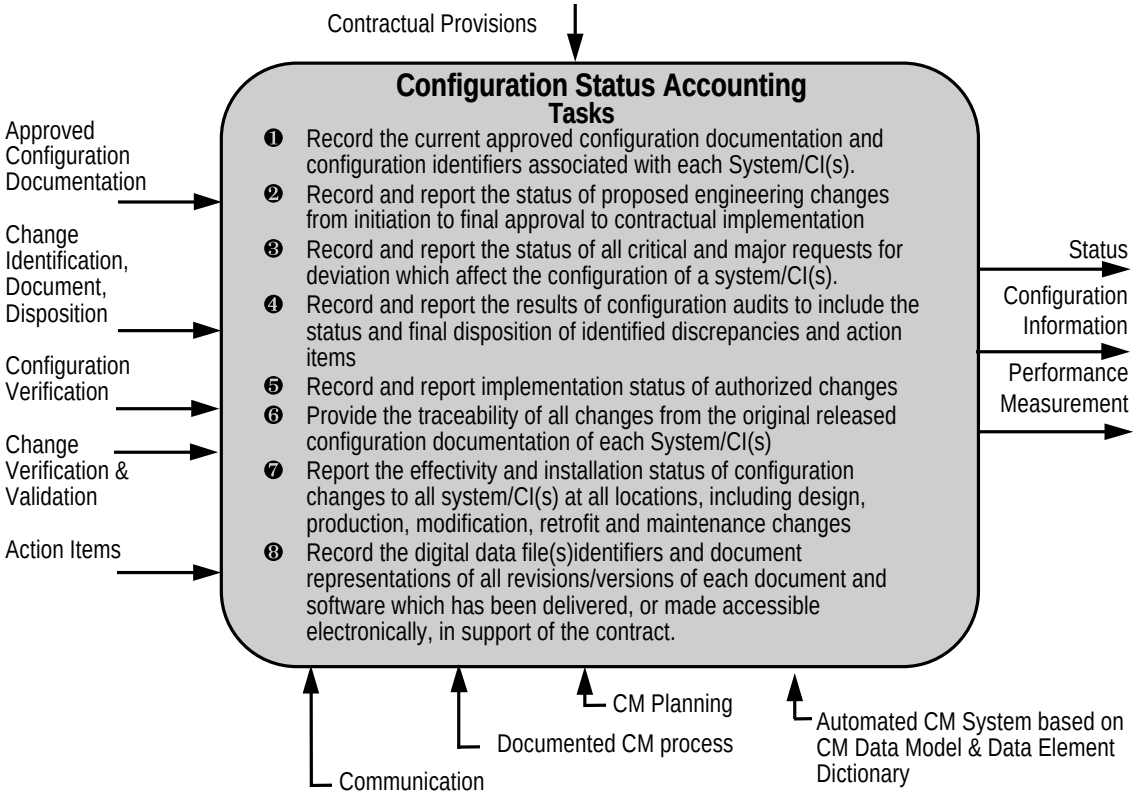
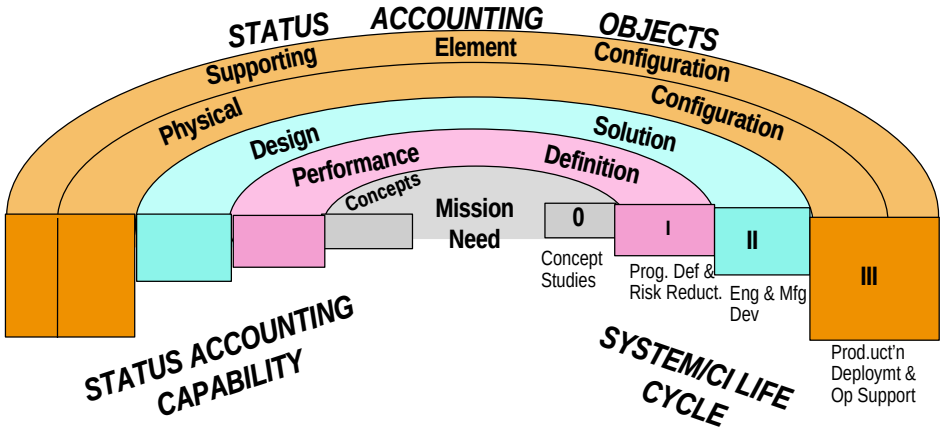


Figure 5-1. Configuration Status Accounting Activity Model



CSA evolves over the product life cycle, capturing more detailed information and enhancing its value as an information resource

Figure 5-2. Configuration Status Accounting Evolution over the System/CI Life Cycle

activity. Some of these tasks also may not span the entire life cycle. The allocation of responsibilities within these functions (tailoring) must be accomplished during the CM planning activity and should take into account the degree to which the Government information technology infrastructure has been upgraded.

Contractor integrated technical information services (CITIS) is the CALS (Continuous Acquisition Life Cycle Support) term used to describe the interfacing technology enabling the Government to access data from contractor systems and to transfer data electronically **[Details: Section 7]**. Under such an environment, information will reside where it is most economical and will be accessible for use, on line, by all who have appropriate data rights and are granted access privileges Contractor and Government CSA information could be merged in what would appear to be a seamless (virtual) data base. The goal of a fully integrated data environment in which Government and contractors share information is technically within reach. In such an environment, data input by one source is accessible to all associated organizations in the program chain from subcontractors to contractors, government acquisition offices, depots, and maintenance and other field activities.

The Government's Automated Configuration Management Information System (CM AIS) and MIL-STD-2549 are essential steps in the process of achieving that goal . Fully automated, interactive contractor/Government CSA systems which implement the conceptual schema defined by the MIL-STD-2549 data model/data element dictionary would be capable of moving data from one system to the other and of on-line access. Such systems linked to Government and contractor data repositories for retrieval of archival data, would be the cheapest possible operational scenario with the most accurate and easily accessible information. Querying a DoD CSA data base would yield such information as

- The as-designed, as-built, as-delivered, or as-modified configuration of any serial number of the product as well as any component within the product.
- For software, the as-delivered, as modified, as tested configuration of any CSCI, as of any date.
- The current status of any change, the history of any change, and the schedules for and status of verifications and audits, as well as resultant action items
- Metrics (performance measurements) on CM activities for use in monitoring the process and in developing continuous improvements. To the extent that contractor and Government data bases and processes are integrated, the DoD CM Manager could also monitor performance trends at the contractor.

While at the present time such a system is not a reality, partial solutions are currently being implemented building upon legacy systems that are in place. Legacy systems are typically more expensive to run because they require more interaction by personnel, redundant input, and more hands-on operational support and system administration. However, all of the information required to accomplish the complete CSA function can be captured and supplied using stepping stone implementations such as CMIS 5.0 (presently being deployed at a number of sites), and commercial configuration management and product data management tools (which promise to embrace the MIL-STD-2549 data model). With appropriate links to logistics and maintenance systems, the following evolution of CSA information shown in **Table 5-1** is possible over the life cycle.

Some of the above status accounting inputs and outputs are routinely available in a contractor's data base, some are specialized information that the Government (or a third party contractor to the Government) would need to access. Other information is inherent to Government data bases and needs to be shared between Government and contractor. The amount and type of design information in the data base to which the Government needs access rights varies based on the documentation which the Government controls. The division of responsibility was simple when the Government baselined and controlled the Product Baseline on all weapon systems and organically supported each CI. In the environment of acquisition reform, the determination is more complex and cannot be made generically. The Government will control detailed design data only for specifically authorized items. Otherwise the Government will normally control only the performance requirements, which include interface and envelope requirements. The Government will take delivery of a technical data package (TDP) only if the Government baselines the product configuration, or if it acquires the TDP at the end of production, or when contractor support responsibility ends.**[Detail: Section 3.5.1, 3.7.1, 3.7.2]**

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Table 5-1. Typical CSA Information Over The Acquisition Program Life Cycle

Program Phase	Typical Information Sources	Typical Outputs
0 - Conceptual Studies	• Mission need statements • Baseline performance/ cost/schedule goals • System requirements documents for alternative configurations • Engineering change proposals or contract change proposals, as applicable	• Current revision of each document • CDCA and approval status for each document
I - Program Definition & Risk Reduction	• Preliminary System Performance Specifications for selected configuration • Prototype design data • Test Plans, procedures & results • Engineering reports • Engineering change proposals or contract change proposals, as applicable	• Current revision of each document • Release date • CDCA and approval status for each document
II - Engineering & Manufacturing Development	• System performance specification • CI performance specifications • CI detailed specifications • Engineering drawings and associated lists • CAD files • Test plans/procedures • Audit plans • Audit reports • Audit certifications • Engineering change proposals • Request for deviation • NORS • Engineering orders, change notices, etc. • Installation and as-built verification • Removal and re-installation	• Release and approval status of each document • Current (Government and/or contractor) Functional, Allocated and Product baselines • Baselines as of any prior date • As-designed configuration, current and as of any prior date • As-built configuration, current up to time of delivery, and any prior date • As-delivered configuration • Status of ECPs, RFDs in process by contractor, by Government • Effectivity and incorporation status of approved ECPs, RFDs, including retrofit effectivity • Test and certification requirements to be completed prior to milestones such as reviews, demonstrations, tests, trials, delivery • Verification and audit status and action items
III - Production, Deployment & Operational Support	• All Phase II Items • System CI location by S/N • Support equipment and software • Spares • Trainers • Training Materiel • Operating and Maintenance Manuals, IPBs • CI Delivery dates and warranty data • Shelf life or Operating limits on components with limited life or limited activations, etc. • Operational history (e.g., for aircraft - take-offs and landings) • Verification/Validation of Retrofit Instructions, Retrofit Kits • Incorporation of Retrofit Kits • Installation of spares, replacements by maintenance action	• All Phase II items • Current configuration of all Systems/CIs in all locations (As-modified/As-Maintained) • Required and on-board configuration of all Support Equipment, Spares, Trainers, Training, Manuals, Software, Facilities needed to operate and maintain all systems/CIs at all sites • Status of all Requested, in Process and Approved changes and deviation requests • Authorization and Ordering actions required to implement approved changes, including recurring retrofit • Warranty status of all CIs • Predicted replacement date for critical components • Retrofit actions necessary to bring any serial numbered CI to the current or any prior configuration

The government's range of CSA access is normally limited to data for which they have configuration control and provides logistic support; the contractor normally monitors the data for those items it supports. Some of the information that must be shared concerns items under warranty. It is important for the Government to know what the warranty period is on each item that needs repair, as well as the date that the warranty began for each serial number. A ready reference to this data by logistics support personnel could result in cost savings to the Government if it is used to determine the priority used to ship items back to the manufacturer for repair. This is an instance of the Government adapting to standard industry practice.

New and innovative methods of capturing the configuration of installed and spare items and software versions are becoming commonplace. These methods include bar coding and the interrogation of embedded identification via on-equipment data busses and on-board support equipment. The technology for this process is now commonplace in the commercial personal computer industry and the automotive industry.

The information that is loaded into CSA is considered "meta-data", i.e. information about the data. It provides status and cross-references actual TDP information that is stored digitally in contractor and Government data repositories. Each design activity establishes a document repository for the CIs developed, produced or maintained by an OPR under their authority. The data repositories are normally maintained by the inventory control point responsible for the provisioning/supply support of the CI. (For example, the Weapon Systems Files (WSF) at the Ships Parts Control Center, Aviation Supply Office (ASO), and the DLA, Air Force and Army supply centers. Each DoD Activity responsible for a data repository would identify the repository by listing it in MIL-HDBK-331.) Current CSA records are maintained in such range and depth as to be responsive to the requirements of the various support activities for access to configuration information. The data repository is the central point for the collection, storage, processing, and promulgation of this data. Configuration information should be available on a request basis, either by hard copy or on-line computer access. The CSA records are used as "best source" input data for purchase data packages, design studies, and management analyses requested by the supporting/design activities. In particular, the CSA meta data records must accurately reflect the status of the configuration documents (specifications, drawings, lists, test reports, etc.) maintained in the document repositories.

MIL-STD-2549 facilitates the evolution from legacy systems and legacy data by providing a means to map current data fields to the conceptual schema, and to the common data fields that will enable exchange of CM information on a more universal basis[Details: Appendix B]

5.3 CSA Activity Guides

Table 5-2 provides an activity guide for the evaluation of a configuration status accounting process.

Table 5-3 is an activity guide designed to aid the tailoring process for MIL-STD-2549 and to aid in clearly establishing the separate but interrelated domains of the contractor's status accounting process and the Government's status accounting process since each configuration status accounting task may be assigned to either the Government or a contractor. These guides, keyed to each of the tasks listed in Figure 5-1, provide:

- Inputs and outputs types (categorized by the generic input and outputs shown in Figure 5-1)
- Correlation to the information packets in MIL-STD-2549
- The life cycle phases during which the information is typically needed.

Table 5-2. *Activity Guide*: Configuration Status Accounting Process Evaluation Checklist

✓	Criteria
	1. Documented Process
	a. Does the contractor have a documented Configuration Status Accounting process?
	b. Does the contractor follow his documented process?
	c. Are contractor personnel from all disciplines involved in the process informed and knowledgeable about the procedures they are supposed to follow?
	2. CSA Information
	a. Has the contractor established an accurate, timely information base concerning the product and its associated product information, appropriate to the applicable phase(s) of the life cycle?
	b. Is configuration information, appropriate to the product systematically recorded and disseminated?
	c. Is applicable CSA information captured as CM tasks are performed, and is it available for display or retrieval in a timely fashion?
	3. CSA System
	a. Is the Contractor's data collection and information processing system based on, consistent with, the configuration status accounting information needs of the Contractor and of the Government?
	b Do the data elements in the contractors system map effectively to the Government's CM AIS, as reflected in the MIL-STD-2549 data packets tailored for application to the current phase of the program?
	c. Are the data relationships in the contractor's system based on a sound set of business rules?
	d. Are the contractors business rules consistent or compatible with the Government's, enabling an accurate transfer or sharing of information?
	4. Metrics
	a. Does the status accounting data being collected and the information system enable meaningful metrics to be developed and used to maintain and improve the CM process?

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Table 5-3. *Activity Guide:* Configuration Status Accounting Tasks

Type of Input	Phase 0	Phase I	Phase II	Phase III	MIL-STD-2549 Information Packets[1]	Type of Output
❶ **Task Description:** Record the current approved configuration documentation and configuration identifiers associated with each system/CI(s)						
• Approved Configuration Documentation	✓ 2	✓	✓	✓	1, 3, 6, 7	• Configuration Information
❷ **Task Description:** Record and report the status of proposed engineering changes from initiation to final approval and contractual implementation						
• Change Identification, Documentation And Disposition			✓	✓	2, 4, 5, 6	• Status • Performance Measurement
❸ **Task Description:** Record and report the status of all critical and major requests for Deviation which affect the configuration of a system/CI(s).						
• Change Identification, Documentation And Disposition			✓	✓	4, 5, 6	• Status • Performance Measurement
❹**Task Description**: Record and report the results of configuration audits to include the status and final disposition of identified discrepancies and action items.						
• Action Items			✓	✓	5, 6	• Status • Performance Measurement
❺ **Task Description:** Record and report implementation status of authorized changes.						
• Approved Configuration Documentation • Change Identification, Documentation And Disposition • Configuration Verification • Change Verification & Validation			✓	✓	2, 3, 4. 5, 6	• Status • Configuration Information • Performance Measurement

1 The following data information packets and the associated DIDs must be tailored to select the applicable sub-packets and choose the optional data fields that are applicable in accordance with MIL-STD-2549, Appendix A. (See Appendix B of this handbbok for further Tailoring Guidance):

DIP1. Drawings, Specifications, Standards, Software and Software Support Documents data information packet /DID-CMAN-81544
DIP2. General Document data information packet/DID-CMAN-81545
DIP3. Product/Asset Configuration data information packet/DID-CMAN-81546
DIP4. Configuration Change Control data information packet/DID-CMAN-81547
DIP5. Configuration Management Action Tracking data information packet/DID-CMAN-81548
DIP6. Project Management data information packet/DID-CMAN-81549
DIP7. Parts List and Index List data information packet/DID-CMAN-81550
DIP8. *Basic Document Protection data information packet
DIP9. *Basic File Information data information packet
DIP10. *Basic Document Representation data information packet

(*The basic packets (8-10) are invoked via the other packets whenever documents are involved.)

2 Or other documentation informally controlled during this phase

Table 5-3. *Activity Guide:* Configuration Status Accounting Tasks

Type of Input	Phase 0	Phase I	Phase II	Phase III	MIL-STD-2549 Information Packets[1]	Type of Output
❻ **Task Description:** Provide the traceability of all changes from the original released configuration documentation of each system/CI(s)						
• Approved Configuration Documentation • Change Identification, Documentation And Disposition • Configuration Verification • Change Verification & Validation			✓	✓	1, 4, 6, 7	• Status • Configuration Information
❼ **Task Description:** Report the effectivity and installation status of configuration changes to all system/CI(s) at all locations, including design, production, modification, retrofit and maintenance changes.						
• Approved Configuration Documentation • Change Identification, Documentation And Disposition • Configuration Verification • Change Verification & Validation • Action Items				✓	1, 3, 4, 5, 6	• Status • Configuration Information • Performance Measurement
❽**Task Description:** Record the digital data file(s) identifiers and document representations of each document and software which has been delivered, or made accessible electronically in support of the contract.						
• Approved Configuration Documentation • Change Identification, Documentation And Disposition	✓3	✓	✓	✓	1, 2, 4, 6, 7, 8-10	• Status • Configuration Information • Performance Measurement

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3 Or other documentation informally controlled during this phase